Forecasting the Yield Curve: An Econometric Study

Vsevolod Zaostrovsky, Ivan Cherepakhin, Artemy Sazonov
Supervisor: Ivan P. Stankevich
Lomonosov Moscow State University

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Data

Figure: YTM for three different TTM

Yield Curve

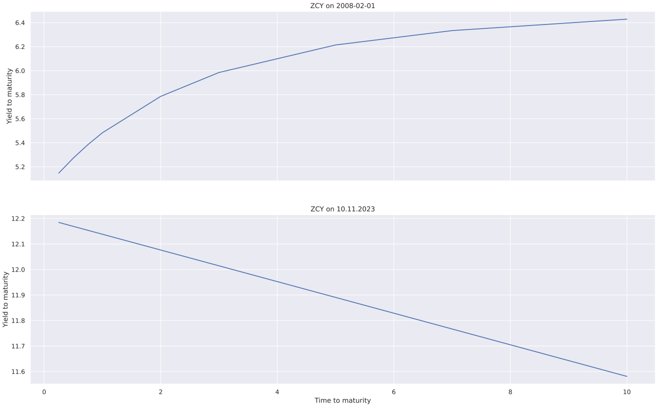

Figure: The yield curves in two different moments of time

Naive approach

Results (MAE)

Time to maturity	auto-ARIMA	ARIMA(0, 0, 0)	RW	VECM(2)	GARCH
3m	0.0045	0.0047	0.0109	0.0193	0.6115
6m	0.0039	0.0041	0.0100	0.0182	0.4658
9m	0.0035**	0.0038	0.0095	0.0178	0.5676
12m	0.0038**	0.0039	0.0069	0.0194	0.7794
5y	0.0052	0.0053	0.0072	0.0182	1.2742
15y	0.0059	0.0061	0.0076	0.0174	1.9276

Table:

Nelson-Siegel parametric model

Model definition

The static NS model is defined as follows:

$$G(T) = \beta_0 + (\beta_1 + \beta_2)\frac{\tau}{T}\left(1 - e^{-\frac{T}{\tau}}\right) - \beta_2 e^{-\frac{T}{\tau}}, \tag{1}$$

where T is the time to maturity, $G(T)$ is the yield estimator of the government bonds from the curve basis, and the parameters to be estimated are

1. τ is the 'typical' time to maturity,
2. β_0 is the long-run of zero-bond yields,
3. β_1 is the mid-run of zero-bond yields,
4. β_2 is the short-run of zero-bond yields.

Nelson-Siegel parametric model

Forecasting the factors

Factor	auto-ARIMA	VAR(1)	RW
β_0	53.78356	131.1459	66.3105
β_1	63.31042	143.9235	66.25878
β_2	133.9688	388.3436	177.1525
τ	1.083687	2.569167	1.328986

Table: Calibrated factors

Conclusion

We found out that:

1. It is better not to use naive time series models to predict bond yields directly …
2. …since the first difference of bond yields is a «martingale» wrt the given information.
3. Research structural breaks of the yield curve.

Our plans for the future of this paper:

1. Try more complicated modifications of Nelson-Siegel model.
2. Add exogeneous variables.
3. Research the structural breaks.